Form ESA-B4. Summary Report for ESA-187-2
Public Report - Final

Company	ArcelorMittal	**ESA Dates**	10/30/07 – 11/1/07
Plant	New Carlisle, IN	**ESA Type**	Compressed Air
Product	Steel	**ESA Specialist**	Kyle Harris

Introduction:

ArcelorMittal is the world's leading steel company, with operations in more than 60 countries. It is the leader in all major global steel markets, including automotive, construction, household appliances and packaging, with leading R&D and technology, as well as sizeable captive supplies of raw materials and outstanding distribution networks. With an industrial presence in over 20 countries spanning four continents, the Company covers all of the key steel markets, from emerging to mature.

The United States Department of Energy (DOE) "Save Energy Now" program completed an Energy Savings Assessment (ESA) October 30, 2007 at the ArcelorMittal, I/N Tek – I/N Kote facility in New Carlisle, Indiana. The DOE Qualified Specialist/Energy Expert conducting the compressed air system ESA was Kyle Harris of Accurate Air Engineering, Inc., Bakersfield, California.

The ArcelorMittal, New Carlisle compressed air system includes four centrifugal air compressors operating in a central location serving a number of different end uses. The four air compressors are all driven with 1,250 hp electric motors. The plant uses compressed air on a 52 week per year, 7 days a week, 24 hours per day schedule. Currently, the compressed air system uses over 23,790,000 kWh/year and accounts for almost 6% of the total plant electricity consumption.

Objective of ESA:

Identify compressed air system improvement recommendations, train plant personnel how to correctly model the current system and predict potential savings using the DOE AIRMaster+ software tool.

Focus of Assessment:

Compressed air supply, distribution and end uses.

Approach for ESA:

Power and flow data was collected from a site energy management system, verified and adjusted as needed. Together, the DOE ESA Expert and plant personnel used LogTool V2 to interpret the data and format the data for direct import into AIRMaster+. Compressor profiles were developed and a baseline compressed air profile was created within AIRMaster+.

A survey of the compressed air supply and demand was completed. As part of the "training assessment" the plant personnel, with direction from the DOE ESA Expert, created a number of energy efficient measures to evaluate the impacts of each measure. Ultimately, these measures were prioritized in order to achieve the best effect of the improvements. A closeout meeting was conducted to present the findings to a number of plant personnel that may be affected by the proposed improvements.

General Observations of Potential Opportunities:

The following section briefly discusses the projects identified for additional investigation or implementation. A qualifier is assigned to each project – *near-term, medium-term* or *long-term.* These descriptors are identified as follows:

- *Near-term* opportunities would include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
- *Medium-term* opportunities would require purchase of additional equipment and/or changes in the system. It would be necessary to carryout further engineering and return on investment analysis.

- *Long-term* opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

Medium-Term Opportunities

- Retrofit Existing Air Dryers

  Currently, three out of the four Ingersoll-Rand 1,250 hp centrifugal air compressors discharge into three Pall T6400 heatless air dryers to dry the compressed air delivered to the plant to a -40 F dew point. In order to maintain this dew point, the air dryers use at least 13% of the compressed air to purge or regenerate the off-stream tower. It is estimated that at least 2,700 cfm is used to purge all three air dryers most of the time.

  This facility has inquired about the conversion of the existing air dryers to heated, blower purge air dryers and has successfully received documentation and quotes to perform the required work. As a first step in demand reduction and so that all future demand reduction measures are successful, it is recommended that this conversion work be completed. All three air dryers should be converted so that all purge air from the compressed air system is eliminated and use a combination of a blower and heater to accomplish the same process.

  It is estimated by converting the existing air dryers that over 1 million kWh or $34,000 annually could be saved with a payback ranging from 4.8 years to 5.8 years depending on the final arrangement. Though the initial payback is high, it is a direct result of the centrifugal control arrangement and must be completed so that all other demand reductions and measures are successful. After this measure is complete, the third centrifugal would still be required most of the time.

- Replace Open-Blowing Applications

  There are a number of open-blowing applications in the facility that could be eliminated or replaced with blowers. The largest application found was on the Tek Capl Temper Mill where some of the blow offs were originally installed for a different product but were left in place even after the product or drying requirements changed. Most open blowing applications can successfully be modified to use low pressure blowers as an alternative thereby reducing the demand on the compressed air system. This retrofit should be performed on at least the Tek Capl Temper Mill.

  It is estimated that at least 900 of plant demand is used for these open blowing applications. Once the air dryers are modified and then the open blowing applications are replaced, over 870,000 kWh or $27,000 annually could be saved. The estimated payback is 0.5 to 0.9 years depending on the final arrangement.

- Reduce Plant Air Pressure

  Most of the end use applications at this facility are operated at line pressure or regulated with the regulator “wide open”. Operating at pressure that is higher than required for the end use application increases artificial demand. It is recommended that the compressors be reconfigured to operate and maintain at least 5 psig lower than the current set points.

  It is estimated that at least 400 cfm of artificial demand would be eliminated by lowering the pressure 5 psig. Over 506,000 kWh or $15,000 annually could be saved with a payback ranging from 0.2 to 0.4 years

Long-Term Opportunities

- Add A Trim Air Compressor

  Once the mid-term opportunities are completed, the third 1,250 hp air compressor would still have to operate occasionally which may not be an ideal situation for an air compressor of this type and size. A “trim” air compressor station should be added so that the two of the four centrifugal air compressors operate 100% loaded while the additional demand is performed with smaller rotary-screw air compressor.

  It is recommended that one 200 hp air compressor operating load/unload be installed with control storage and a flow control valve. The set point of the flow control valve in combination with the target pressure of the centrifugal air compressors would maintain the plant air pressure within a tight pressure band and keep the centrifugal compressors full loaded. It is estimated that over 3 million kWh or $95,000 annually could be saved with a payback ranging from 1.5 to 2.0 years.

- Reduce Air Leaks
  Most of the leaks in this plant are currently being identified, repaired immediately or documented for future repair. It is estimated that a least 600 cfm of leaks exist in this large compressed air system and that a minimum of 50% or 300 cfm should target for reduction. Many of these leaks are audible even with the production operating. These should be the first repaired, as they are the largest. In addition, the plant should continue with the leak program and maintain the leak load at this predetermined level. It is estimated that over 108,000 kWh or $3,500 annually could be saved by maintaining the leak load at 400 cfm or lower.

Management Support and Comments:

ArcelorMittal, Inc. is dedicated to reducing energy consumption throughout its plants worldwide. Thomas Kiraly and Don Bakker provided support prior to the ESA commencing as well as during and after the ESA. They are dedicated to improve the compressed air system at the New Carlisle plant.

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